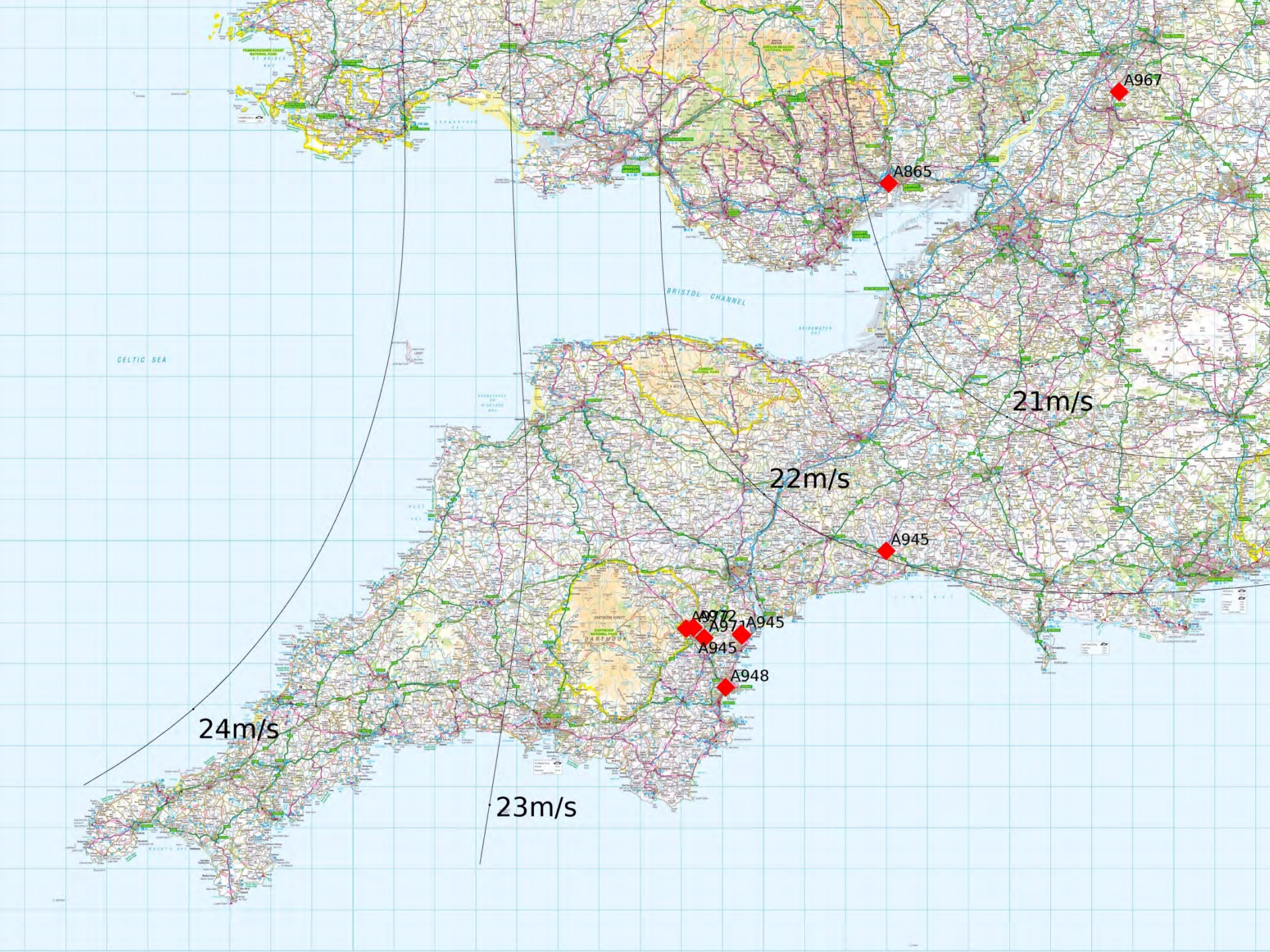
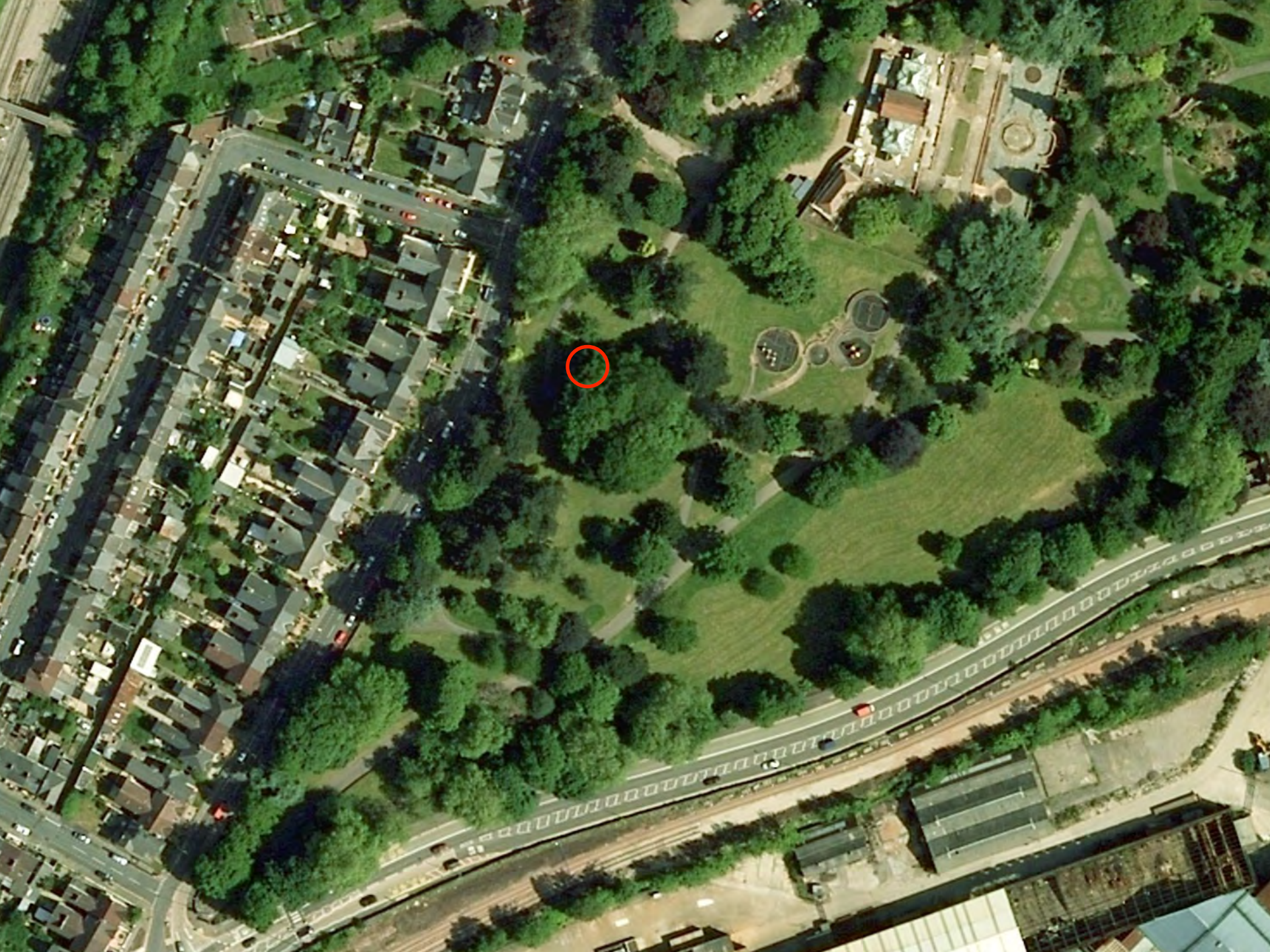

Quercus Rubra (Red oak)
Gorsedd Circle, Belle View Park, Newport
Paul Muir - Treework Environmental Practice


A967
A865
BRISTOL CHANNEL
CELTIC SEA
21m/s
22m/s
A945
A945
A945
A948
24m/s
23m/s

St Julians
Ty-Du / Rogerstone
Rogerstone
Fox Hill
Twyn y Cadno
Barrack Hill
Crindau
East Usk
Marshes
Summerhill
Barnardtown
Beechwood
Christchurch
Coldra
Ringland
Lawrence Hill
Ridgeway
Allt-yr-yn
Gold Tops
Newport
Newport Castle
CASNEWYDD / NEWPORT
Maindee
Llanwern
Alway
Baneswell
Clytha Park
Caerau Park
Stow Park
St Woolos
Stelvio
High Cross
Rhiwderin
Gaer
Glasllwch
Bassaleg
Dyffryn Court
Pillgwenlly
Somerton
Liswerry
Garth
Parkwood House
Tredegar Park
Level of Mendalgief
Maes-glas
Croes-Cam-Einion
Graig-Y-Saeson
Cleppa Park Cottage
Pensylvania Cottage
Clearwell
Pen-y-lan
Duffryn
Cold Harbour Reach
Spencer Steelworks
Broadstreet Common
Pye Corner
Ty Du Farm
Cleppa Park
Wentlooge Level
Caldicot Lev
Great Pen-Carn
Coedcernyw / Coedkernew
Castleton
Tyn-Y-Nant Cottage
Maerdy Farm
Red Arch Piggery
Pound Farm House
West Usk Lighthouse
Uskmouth
Nash
Henton Farm
Cross Farm
Chestnut Tree Cottage
Redhouse Farm
Little Newra
Saltmarsh
March
Marshfield
Blacktown
Wentlooge Level
Llansanffraid Gwynllwg / St Brides Wentlooge
Common Farm Cottages
Sea View
Greenmoor Farm
Walnut Tree Farm Cottage
Lighthouse Park
Greenacre Farm
Peterstone House
River Usk
Mouth of the Severn
Bristol Channel
M4
A48
A48(M)
A467
A4042
A4051
A4072
B4591
B4237
B4239
B4236
B4237

CASNEWYDD / NEWPORT
Newport Castle
Newport
East Usk
Marshes
Barnardtown
Summerhill
Beechwood
Maindee
Allt-yr-yn
Gold Tops
Ridgeway
Baneswell
Clytha Park
Caerau Park
Stow Park
St Woolos
Stelvio
Glasllwch
High Cross
Bassaleg
Gaer
Pillgwenlly
Level of Mandalgief
Maes-glas
Tredegar Park
Duffryn
Ynysfro Reservoirs
M4
A4051
B4591
A467
A4072
B4237
A48
27
28
Highcross Road
Ridgeway Avenue
Fields Park Road
Allt-yr-yn Avenue
Bassaleg Road
Western Valley Road
Park View
Forge Road
Cardiff Road
Spytty Road
Usk Way
George Street
Cromwell Road
Commercial Road
Stephenson Street
Corporation Road
Docks Way
Duffryn Drive
Lighthouse Road
Duffryn Way
Old Dock Reach
Cold Harbour Reach
Town Reach
Afon Wysg / River Usk
Kennel Covert
Tredegar Reen
Sea Wall Reen
Coed-y-Glasllwch
Craig-Y-Saeson

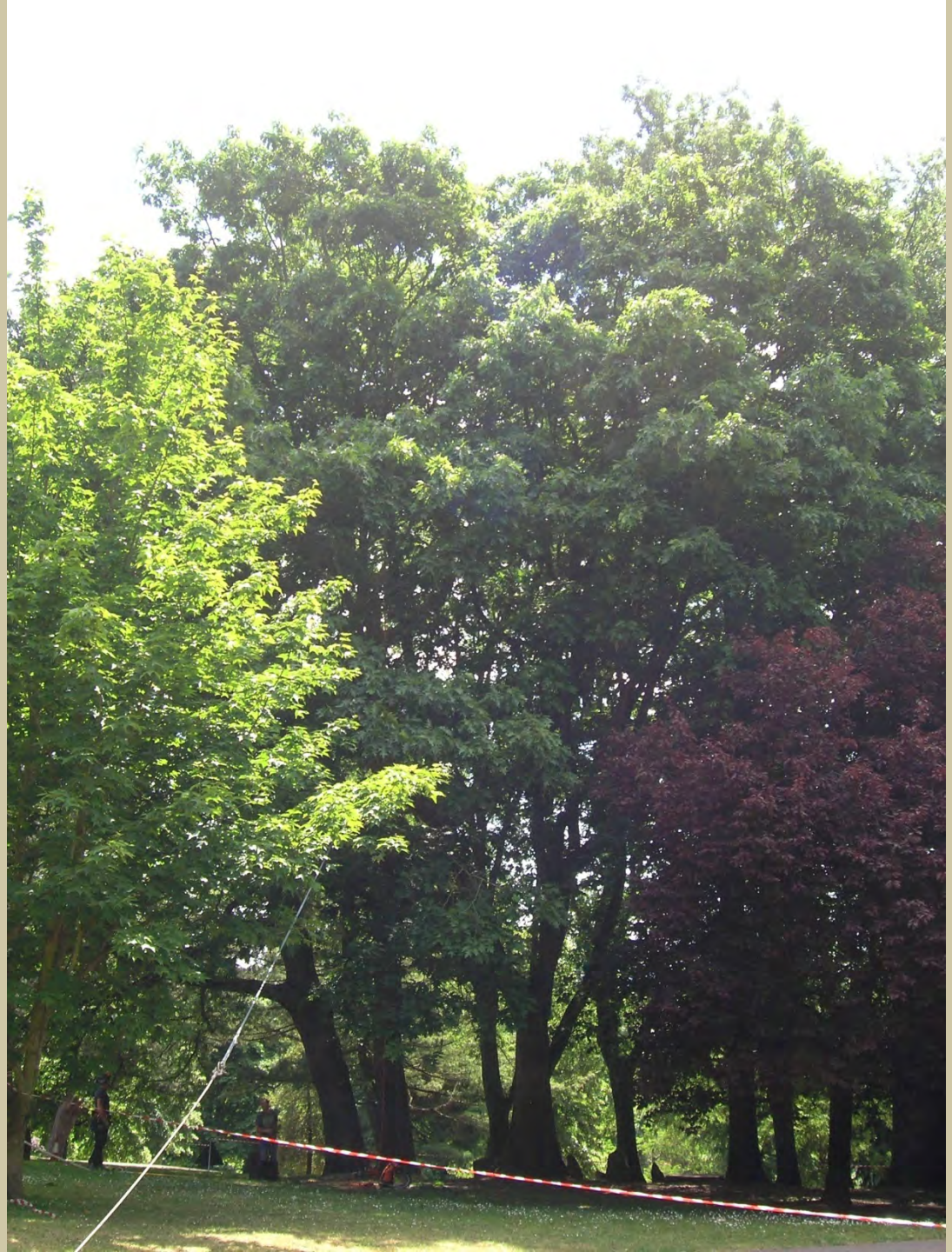


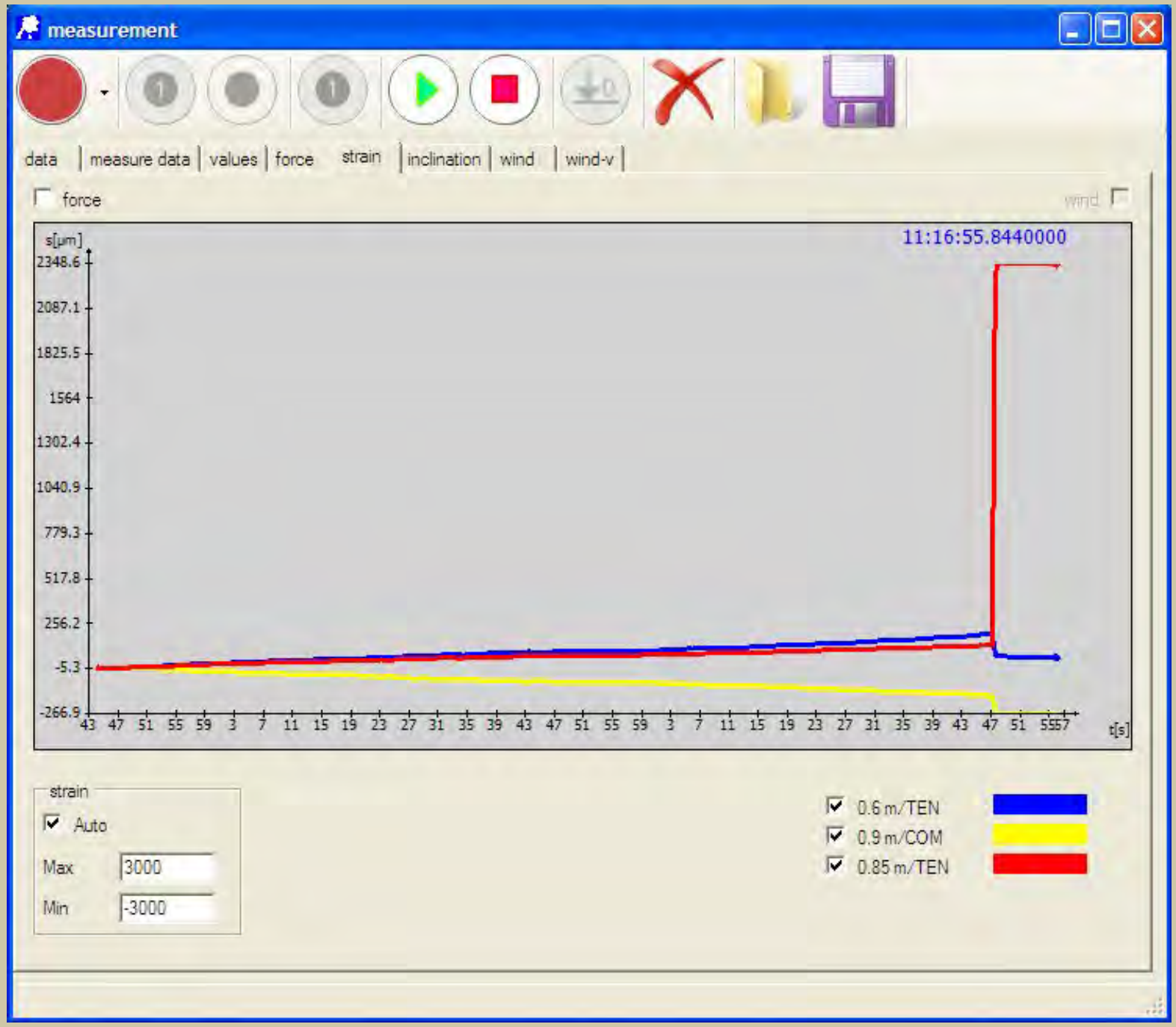
North west

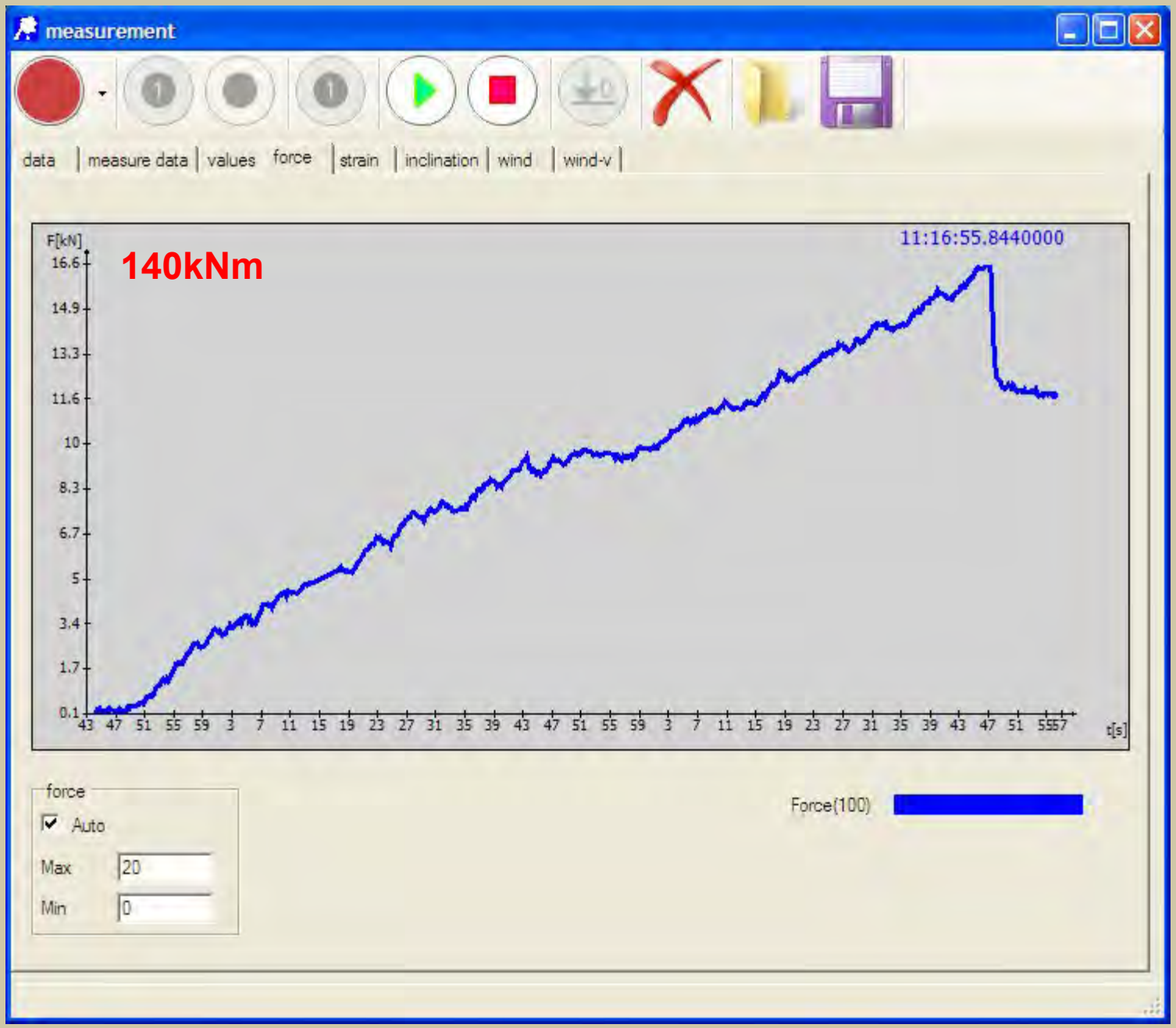
South west (note young brackets developing in flute above main bracket)

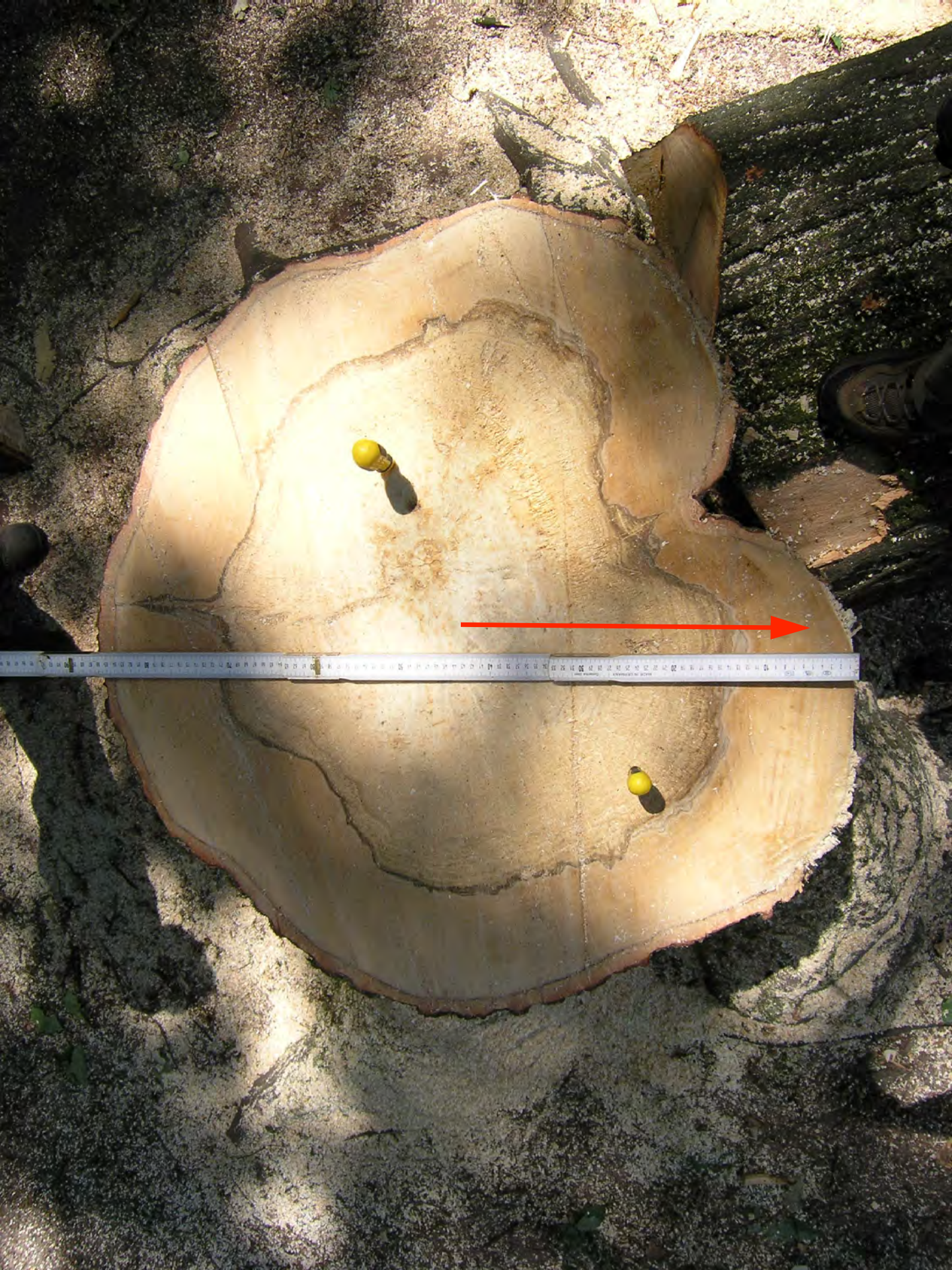
South east

North east – appears to be oldest bracket with decay extending deepest into base of trunk




measurement
data
measure data
values
force
strain
inclination
wind
wind-v
force
wind
11:16:55.8440000
s[µm]
2348.6
2087.1
1825.5
1564
1302.4
1040.9
779.3
517.8
256.2
-5.3
-266.9
43 47 51 55 59 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 3 7 11 15 19 23 27 31 35 39 43 47 51 55 57
t[s]
strain
Auto
Max
3000
Min
-3000
0.6 m/TEN
0.9 m/COM
0.85 m/TEN


measurement
data
measure data
values
force
strain
inclination
wind
wind-v
F[kN]
16.6
14.9
13.3
11.6
10
8.3
6.7
5
3.4
1.7
0.1
140kNm
11:16:55.8440000
43 47 51 55 59 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 3 7 11 15 19 23 27 31 35 39 43 47 51 55 57
t[s]
force
Auto
Max
20
Min
0
Force(100)



3 m
MADE IN
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24


3 m
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
MADE IN GERMANY

Wind Load Analysis analogous to DIN 1055-4

Project

Project Name	Belle Vue Park	
Project Number	A865	
Test Date	25.06.2010	

Site **Tree Number** **625**

Belle View Park
Newport
NP20 4FP Newport, UK

Altitude a. sea level	30	m

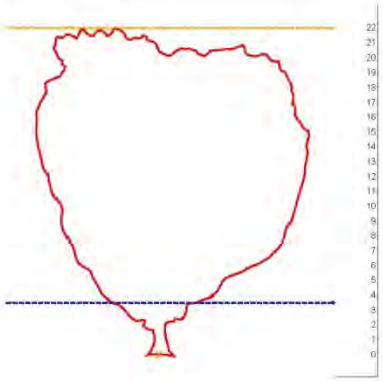
Tree Data

Tree Species	Quercus rubra		
Stem circumference		263	cm
Stem Diameter	||	87	cm
in 1m height	_|_	90	cm
Bark Thickness (1m)		1,5	cm
Tree Height		**22**	**m**

Applied Material Properties

as for	Quercus rubra	
Source	Stuttgart	
Compressive Strength	20	MPa
Modulus of Elasticity	7200	MPa
Limit of Elasticity	0,28	%
Green Density	1	g/cm³

Crown Outline



Load Direction NW / 303.5°

Surface Area Analysis

Crown Base	3,5	m
Effective Height	14,6	m
Total Surface Area	270	m²
Crown Eccentricity	0,69	m

Applied Structural Parameters

Drag Factor	0,25	
Eigenfrequency	0,43	Hz
Damping Ratio	0,54	
Form Factor for Dead Weight	0,8	

Applied Site Parameters

Windzone	D 1	
Speed of Applied Design Wind Speed	22,5	m/s
Air Density	1,29	kg/m³
Roughness Catagory	Landscape	
Exponent for Wind Profile	0,16	
Proximity Factor for Effects in Near Ground Wind Flow	1,08	
Factor for Crown Exposure	0,7	

Results

Wind Load Analysis

Mean Wind Pressure	18,9	kN
Gust Reaction Factor	2,11	
Load Centre	13,3	m
Torsion Moment	27	kNm
Design Wind Load	**527**	**kNm**

Tree Static Analysis

Dead Weight Tree	10,1	t
Critical Degree of Hollowness	82	%
Critical Residual Wall Thickness	8	cm
Assuming an Uncompromised Residual Wall		
Basic Safety Factor	**2,2**	

General

Comments

Calculated Fracture Stability according to Pull Test

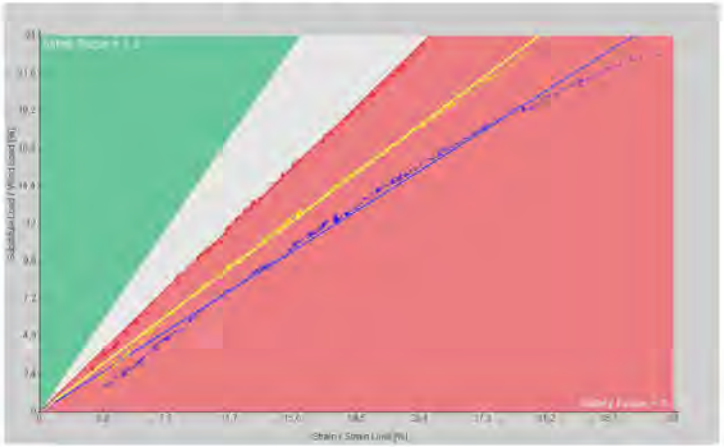
Tree Data

Project	Belle Vue Park	**Tree Number**	**625**
Tree Species	Quercus rubra	Date	25.06.2010

Setup Pulling Test

Height of the Stem Anchor	8,5 m	**Measurement No.**	**1**
Rope Angle	17 °	Load Direction	NW / 303.5°

Graphic Display (test data and best linear fit)



Elastometer Measurement	in	90	91	92
Measurement Height	**m**	**0,6**	**0,9**	**0,85**
Position		TEN	COM	TEN
Stem Diameter 1	cm	107	85	93
Stem Diameter 2	cm	112	91	97
Bark Thickness (1m)	cm	1,5	1,5	1,5

Breaking Stability (derived from the gradient of the best linear fit)

Safety Factor	**0,66**	**0,78**	**1**

Control Value

Coefficient of Determination R^2	0,9915	0,9976	0,9985
Residual Stiffness %	15	34	33,8
Degree of Hollowness %	94,7	87,1	87,2
Compression originating from			
Dead Weight %	5,3	3,5	3
Substitute Load %	22,8	23	23,7

Calculated Tipping Stability according to Pull Test

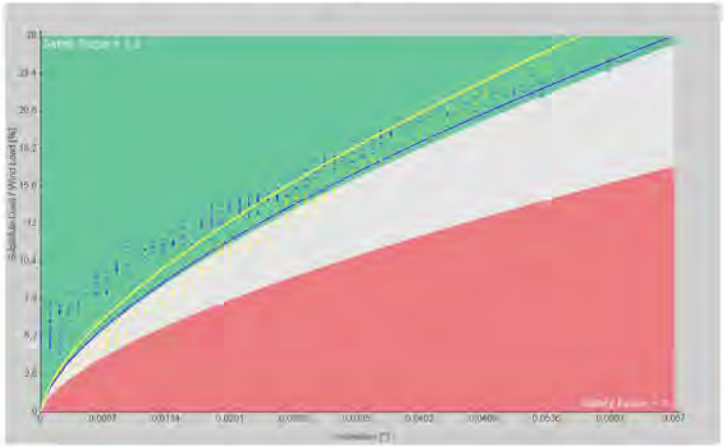
Tree Data

Project	Belle Vue Park	**Tree Number**	**625**
Tree Species	Quercus rubra	Date	25.06.2010

Setup Pulling Test

Height of the Stem Anchor	8,5 m	**Measurement No.**	**1**
Rope Angle	17 °	Load Direction	NW / 303.5°

Graphic Display (test data and best fit to tipping curve)



Inclinometer Measurement	80	81
Position	SW	NNW

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	**1,54**	**1,7**

Control Value

in		
Standard Deviation %	2,5	1,63
Substitute Load %	25,6	25,6
Load Direction at Inclinometer	x-Axis	x-Axis

General for Pull Test

Consultant	Paul Muir
Witness / Assistant	
Measurement Comments	

Implications

Treework Environmental Practice

Strain data (prior to crack formation) demonstrate very low safety margins (depending on appropriate WLA) and a reaction equivalent to an extremely thin-walled hollow shell

Longitudinal crack likely to have been the result of unusually high level of torsion applied

Would a pure bending moment have initiated this longitudinal crack?

Would a pure bending moment have resulted in a similar reaction in terms of strain?

Would the test have predicted failure if a 100 micron threshold had been followed?


Treework Environmental Practice